Decision Support Systems:
Engaging End Users

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NCAR RAL Decision Support Systems

- Airline dispatchers
- Air traffic controllers
- Pilots
- Army test range staff
- Road maintenance practitioners
- Water resource managers
- Weather forecasters
- Airline operations personnel
- Airport operations personnel
- Pentagon personnel
Why is this topic important?

- The importance of connecting science to society has risen in the last decade.
- Most new research funding is targeted or directed to support a societal need.
- Researchers have traditionally not been well connected to end users making it difficult for society to take advantage of results.
- Learning how to engage end users is critical for advancing science and technology.
Decision Support Systems

What is a decision support system?

a) An automated tool that makes decisions?
b) A semi-automated tool?
c) A handbook of recommended practices?
d) Local newspaper or news program?
e) Student assistant?

Answer: All the above!
The best way to understand how someone will utilize new information is to introduce it into the operational environment.

They way the new information is used will evolve (sometimes significantly) over time.
Before one can consider developing or implementing a DSS, some important questions need to be asked.
Decision Support Systems

First Question:

1) What problem(s) are you trying to solve?

This must be asked several different ways before a potential solution may emerge.
Decision Support Systems

2) What is the culture of your organization?
   - Would a DSS be seen as threatening?
   - Does automation pose problems?
   - Are general support tools viewed positively?

3) What actual decisions could be supported?

4) What job categories would benefit most?
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5) What technical capabilities exist?
   - Is there an in-house framework for a DSS?

   > Network system (external & internal)
   > Desktop computers available?
   > Remote communications used (PDAs)
   > Database of pertinent data
6) What are the potential benefits?
   - Safety
   - Productivity/Efficiency

7) Who will champion the technology?
   - Management vs. staff
   - Technology push or pull?
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Application Categories:

1) Strategic Planning (condition prediction)
2) Tactical Planning (alert functions)
3) Operations Management (productivity)
4) Incident Management (notification function)
5) Risk Management
6) Evaluation of “What if?” scenarios
7) Training Tool (off line assessments)
DSS Development Issues

• There are no off-the-shelf plug and play weather and climate capabilities that can fully address the needs of all user communities. No “one-size-fits-all” solutions.

• A “bottoms-up” rather than a “tops-down” approach should be used for DSS system development.

• Stakeholders need to determine the level of sophistication that is required for their specific DSS application.
NCAR/RAL Development Process

Software Concept

Preliminary Requirements Analysis

Design of Architecture and System Core

Evolutionary Delivery

Develop a Version

Incorporate Customer Feedback

Deliver the Version

Elicit Customer Feedback

Deliver Final Version

This method is considered the best software practice from Rapid Development, Taming Wild Software Schedules by Steve McConnell, Microsoft Press, 1996.
Research Needs

• The meteorological community should develop a “Best Practices” guide for engaging end users.

• Weather DSS Testbeds should be established in end-user operational environments to test advanced “products” (methods, techniques, etc.) and to learn how end-users utilize the new information.

• Testbeds should be used to evaluate:
  • how to communicate uncertainty
  • new presentation options
  • how users interpret products
  • identify knowledge gaps in atmospheric science
  • societal aspects of new capabilities
Research Needs

• Weather DSS Testbeds for a variety of economic sectors could be established. Industry partners could help offset costs (in-kind contributions, hosting of technology, etc.)

• Weather DSS Testbeds:
  - Agriculture
  - Surface Transportation
  - Energy
  - Water Resources
  - Aviation
  - Human Health
  - Construction
  - Emergency Management